INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 00/00760

CLASSIFICATION OF SUBJECT MATTER

IPC[7]: G 02 B 27/22, 27/24; G 03 B 21/56

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[7]: G 02 B 27/22, 27/24, 5/04; G 03 B 21/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPOQUE (WPI, EPODOC)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 09 274159 A (TOPPAN PRINTING CO.) 21 October 1997 (21.10.97) figs. 1-4.	1,2,13
A	US 5064273 A (LEE) 12 November 1991 (12.11.91) column 3, line 19 - column 5, line 9.	1-3,13
A	DE 2248873 A (CANON) 12 April 1973 (12.04.73) figs. 2-5, page 4, line 10 - page 5, line 6.	1,2
A	US 4390239 A (HUBER) 28 June 1983 (28.06.83) abstract, column 3, line 11 - column 4, line 68.	1,2,8,12,13

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
„A" document defining the general state of the art which is not considered to be of particular relevance
„E" earlier application or patent but published on or after the international filing date
„L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
„O" document referring to an oral disclosure, use, exhibition or other means
„P" document published prior to the international filing date but later than the priority date claimed
„T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
„X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
„Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
„&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 October 2000 (09.10.2000)	13 February 2001 (13.02.2001)
Name and mailing adress of the ISA/AT Austrian Patent Office Kohlmarkt 8-10; A-1014 Vienna Facsimile No. 1/53424/535	Authorized officer GRONAU Telephone No. 1/53424/320

Form PCT/ISA/210 (second sheet) (July 1998)

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 15 March 2001 (15.03.01)	
International application No. PCT/KR00/00760	**Applicant's or agent's file reference**
International filing date (day/month/year) 13 July 2000 (13.07.00)	**Priority date** (day/month/year) 13 July 1999 (13.07.99)
Applicant SON, Jung, Young et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

31 January 2001 (31.01.01)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Juan Cruz
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

To:

LEE, Jong, Il
#904 BYC Building
648-1, Yeoksam-dong
Kangnam-gu
Seoul 135-080
RÉPUBLIQUE DE CORÉE

Date of mailing (day/month/year)
23 February 2001 (23.02.01)

Applicant's or agent's file reference

IMPORTANT NOTIFICATION

International application No.
PCT/KR00/00760

International filing date (day/month/year)
13 July 2000 (13.07.00)

1. The following indications appeared on record concerning:

[X] the applicant [X] the inventor [ ] the agent [ ] the common representative

Name and Address
LEE, Hyun, Soo
#102-502, Hytsu Apt
Sagen-dong
Sungdong-gu
Seoul 133-060
Republic of Korea

State of Nationality: KR
State of Residence: KR
Telephone No.:
Facsimile No.:
Teleprinter No.:

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[ ] the person [X] the name [ ] the address [ ] the nationality [ ] the residence

Name and Address
LEE, Hyuk, Soo
#102-502, Hytsu Apt
Sagen-dong
Sungdong-gu
Seoul 133-060
Republic of Korea

State of Nationality: KR
State of Residence: KR
Telephone No.:
Facsimile No.:
Teleprinter No.:

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[X] the International Searching Authority
[ ] the International Preliminary Examining Authority
[X] the designated Offices concerned
[ ] the elected Offices concerned
[ ] other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

Authorized officer
Elisabeth KÖNIG
Telephone No.: (41-22) 338.83.38

PA JT COOPERATION TREAT

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

LEE, Jong, Il
#904 BYC Building
648-1, Yeoksam-dong
Kangnam-gu
Seoul 135-080
RÉPUBLIQUE DE CORÉE

Date of mailing (day/month/year)
23 February 2001 (23.02.01)

Applicant's or agent's file reference

IMPORTANT NOTIFICATION

International application No.
PCT/KR00/00760

International filing date (day/month/year)
13 July 2000 (13.07.00)

1. The following indications appeared on record concerning:

[X] the applicant [X] the inventor [ ] the agent [ ] the common representative

Name and Address
LEE, Hyun, Soo
#102-502, Hytsu Apt
Sagen-dong
Sungdong-gu
Seoul 133-060
Republic of Korea

State of Nationality: KR
State of Residence: KR
Telephone No.:
Facsimile No.:
Teleprinter No.:

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[ ] the person [X] the name [ ] the address [ ] the nationality [ ] the residence

Name and Address
LEE, Hyuk, Soo
#102-502, Hytsu Apt
Sagen-dong
Sungdong-gu
Seoul 133-060
Republic of Korea

State of Nationality: KR
State of Residence: KR
Telephone No.:
Facsimile No.:
Teleprinter No.:

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[X] the International Searching Authority
[ ] the International Preliminary Examining Authority
[X] the designated Offices concerned
[ ] the elected Offices concerned
[ ] other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer
Elisabeth KÖNIG

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:
Lee, Jong Il

#904 BYC Bldg., 648-1, Yeoksam-dong, Kangnam-gu, Seoul, 135-080, Republic of Korea

PCT

WRITTEN OPINION

(PCT Rule 66)

	Date of mailing *(day/month/year)* 19 JULY 2001 (19.07.2001)
Applicant's or agent's file reference	**REPLY DUE** within 2 months from the above date of mailing

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/KR00/00760	13 JULY 2000 (13.07.2000)	13 JULY 1999 (13.07.1999)

International Patent Classification (IPC) or both national classification and IPC

IPC7 G02B 27/22, G02B 27/24, G03B 21/56

Applicant

Korea Institute of Science and Technology et al

1. This written opinion is the first (first,etc.) drawn by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

- I [X] Basis of the opinion
- II [ ] Priority
- III [ ] Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Lack of unity of invention
- V [X] Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Certain documents cited
- VII [X] Certain defects in the international application
- VIII [X] Certain observations on the international application

3. The applicant is hereby invited to reply to this opinion.

When ? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d)

How ? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3
For the form and the language of the amendments, see Rules 66.8 and 66.9

Also For an additional opportunity to submit amendments, see Rule 66.4
For an examiner's obligation to consider amendments and/or arguments, seeRule 66.4bis
For an informal communication with the examiner, see Rule 66.6

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 01 DECEMBER 2001 (01.12.2001)

Name and mailing address of the IPEA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, Dunsan-dong, Seo-gu, Daejeon Metropolitan City 302-701, Republic of Korea	KIM, Hyong Chol
Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-5653

Form PCT/IPEA/408 (cover sheet) (July 1998)

WRITTEN OPINION

International aplication No.
PCT/KR00/00760

I. Basis of the opinion

1. With regard to the elements of the international application:*

☒ the international application as originally filed
the description:
☐ pages _____, as originally filed
pages _____, filed with the demand
☐ he claims:
pages _____, as originally filed
pages _____, as amended (together with any statment) under Article 19
☐ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand

2. With rsgard to the language, all the elements marked above were available or furnished to this Authority in the language in which
the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which
☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
☐ the language of publication of the international application(under Rule 48.3(b)).
☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the written opinion was drawn on the basis of the sequence listing:

☐ contained inthe international application in printed form.
☐ filed together with the international
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international applicationas as filed has been furinshed.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:
☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings,sheet/fig _____

5. ☐ This opinion has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box(Rule 70.2(c)).

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed."*

WRITTEN OPINION

International aplication No.
PCT/KR00/00760

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-15	YES
	Claims		NO
Inventive step (IS)	Claims	3, 6, and 9-14	YES
	Claims	1, 2, 4, 5, 7, 8, and 15	NO
Industrial applicability (IA)	Claims	1-15	YES
	Claims		NO

2. Citations and explanations

1. The documents D1=US-A-5064273 and D2=JP-A-0918896 are referred to in this report.

2. D1(figures 1 and 2A) discloses a projector with a screen (1) and a prism panel (5), where the prism panel is a lenticular lens of various shapes of prism cells and directs image beam into a desired angle of the field of view. D1 does not disclose 3-dimensional features. D2(figures 9 and 10) discloses a prism barrier (2) which directs stereo display image into relevant viewing zones. However, D2 does not discloses projectional features. The screen defined in claim 1 is thus considered new relative to the prior arts of D1 and D2. Since claims 2-15 are dependent claims referring back to claim 1, the screen defined in these claims are also new (Article 33(1) and (2) PCT).

3. The present invention defined by claims 1-15 does not describe any detailed means to achieve 3-dimensional effects other than showing Fresnel lens screen in figures 7 and 8. Therefore, the present invention is credited only for the feature of the prism panel with prism cell having a plurality of disperse surfaces. It is known in D1(figures 1 and 2A) that a projector screen (1) of lenticular lens integrated backward by a panel of prism cells which directs image beam into field-of-views at the desired angles. It is also known in D2(figure 10) that 3-dimensional display can be directed at several different angles by prism panel (2). Therefore, it is obvious that the prism panel is adaptable for 3-dimensional projection screen. For the above reasons, claim 1 does not appear to be inventive.

Claims 2 and 4 delimits the thickness of the screen in a negative and indefinite way so that the defined thickness is considered to fall in the usual range. It is usually known that each lenti is comparable in size to pixel as shown, for example, in D2. Therefore, claims 5 and 7 do not appear to be inventive. Claim 8 defines cross-sectional shapes of prism cells that are disclosed in or easily modified from D1 and D2. It is known from D2 the angle between disperse surfaces is near to 180 degrees. Therefore, claim 15 does not appear to be inventive.

In consequence, claims 1, 2, 4, 5, 7, 8 and 15 appear to lack an inventive step (Article 33(1) and (3) PCT).

WRITTEN OPINION

International aplication No.

PCT/KR00/00760

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Reference signs in parentheses should have been inserted in the claims to increase their intelligibility (Rule 6.2(b) PCT).

WRITTEN OPINION

International aplication No.

PCT/KR00/00760

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

"3-dimentional" appeared in the title, the description, and the claims must be corrected as "3-dimensional" (Rule 91.1(d) PCT).

The description does not disclose the invention per claims 5-7, 10, 11, and 13 in such terms that the technical problem and its solution can be understood and does not clearly state the possibly advantageous effects of the invention (Rule 5.1 (a) (iii) PCT).

Claims 8 and 12 are not clear and concise due to unnecessary "etc." (Article 6 PCT).

The description does not describe any detailed means to render the screen, as claimed, 3-dimensional other than showing Fresnel lens screen in figures 7 and 8. Therefore, the 3-dimensional imaging screen in the claims are not fully supported by the description (Article 6 PCT).

Claim 1 is vague, since it is illogical that a screen projects an object on the screen or a screen comprises the same screen (Article 6 PCT).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/KR 00/00760	International filing date (*day/month/year*) 13 July 2000 (13.07.2000)	(Earliest) Priority Date (*day/month/year*) 13 July 1999 (13.07.1999)
Applicant Korea Institute of Science and Technology et al.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
      ☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:
      ☐ contained in the international application in written form.
      ☐ filed together with the international application in computer readable form.
      ☐ furnished subsequently to this Authority in written form.
      ☐ furnished subsequently to this Authority in computer readable form.
      ☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
      ☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.
2. ☐ **Certain claims were found unsearchable** (See Box I).
3. ☐ **Unity of invention is lacking** (See Box II).
4. With regard to the **title**,
   ☐ the text is approved as submitted by the applicant.
   ☒ the text has been established by this Authority to read as follows:
   3-dimensional imaging screen for multi-viewer
5. With regard to the **abstract**,
   ☐ the text is approved as submitted by the applicant.
   ☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. The figure of the **drawings** to be published with the abstract is Figure No.: 7A
   ☐ as suggested by the applicant. ☐ None of the figures.
   ☐ because the applicant failed to suggest a figure.
   ☒ because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 00/00760

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

The present invention employs a beam dividing prism corresponding to a size of a single pixel on a screen in order to create a plurality of viewing zones for multi-viewer, in which a prism panel (66) having an 1-dimensional or 2-dimensional arrangement of a prism cell (68) for dispersing beam in various directions is coupled to the 3-dimensional image projection screen (64) in order to increase the number of the viewing zones, and in which the number and position of the available viewing zones (72,73,74) are determined by the number and a relative position of disperse surfaces (69,70,71) in the prism cell (68). By using the present invention, the desired number of the viewing zones (72,73,74) can be created by selectively adopting the prism cells (68), so realizing the 3-dimensional image display system for multi-viewer.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 00/00760

CLASSIFICATION OF SUBJECT MATTER

IPC[7]: G 02 B 27/22, 27/24; G 03 B 21/56

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[7]: G 02 B 27/22, 27/24, 5/04; G 03 B 21/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPOQUE (WPI, EPODOC)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 09 274159 A (TOPPAN PRINTING CO.) 21 October 1997 (21.10.97) figs. 1-4.	1,2,13
A	US 5064273 A (LEE) 12 November 1991 (12.11.91) column 3, line 19 - column 5, line 9.	1-3,13
A	DE 2248873 A (CANON) 12 April 1973 (12.04.73) figs. 2-5, page 4, line 10 - page 5, line 6.	1,2
A	US 4390239 A (HUBER) 28 June 1983 (28.06.83) abstract, column 3, line 11 - column 4, line 68.	1,2,8,12,13

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
„A" document defining the general state of the art which is not considered to be of particular relevance
„E" earlier application or patent but published on or after the international filing date
„L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
„O" document referring to an oral disclosure, use, exhibition or other means
„P" document published prior to the international filing date but later than the priority date claimed
„T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
„X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
„Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
„&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 October 2000 (09.10.2000)	13 February 2001 (13.02.2001)
Name and mailing adress of the ISA/AT Austrian Patent Office Kohlmarkt 8-10; A-1014 Vienna Facsimile No. 1/53424/535	Authorized officer GRONAU Telephone No. 1/53424/320

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR 00/00760

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
DE	A1	2248873	12-04-1973	GB	A	1403783	20-08-1975
DE	B2	2248873	11-01-1979	JP	A2	48043629	23-06-1973
DE	C3	2248873	30-08-1979	US	A	4078854	14-03-1978
JP	A	09274159 A2				none	
US	A	4390239	28-06-1983	AT	E	5921	15-02-1984
				DE	A1	3018449	19-11-1981
				DE	C2	3018449	05-01-1983
				EP	A2	39768	18-11-1981
				EP	A3	39768	25-11-1981
				EP	B1	39768	18-01-1984
				JP	A2	57006833	13-01-1982
US	A	5064273	12-11-1991	KR	Y1	9201308	22-02-1992

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
LEE, Jong Il
#904, BYC Building
648-1, Yeoksam-dong,
Kangnam-ku
Seoul 135-080
Republic of Korea

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference	Date of mailing (day/month/year) 13 February 2001 (13.02.01)
International application No. PCT/ KR 00/00760	IMPORTANT NOTIFICATION
Applicant Korea Institute of Science and Technology et al.	International filing date (day/month/year) 13 July 2000 (13.07.00)

1. ☑ The applicant is hereby notified that the international search report has been established and is transmitted herewith.

   Filing of amendments and statements under Article 19:

   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendements is normally two months from the date of transmittal of the international search report; however, for more details, see the notes on the accompanying sheet.

   Where? Directly to the International Bureau of WIPO
   34, chemin des Colombettes
   1211 Geneva 20, Switzerland
   Facsimile No.: (41-22) 740.14.35

   For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) initial fee(s) under Rule 40.2, the applicant is notified that:
   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the text of both the protest decision thereon to the designated Offices
   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

   Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis. 1 and 90bis.3, respectively, before.the completion of the technical preparations for international publication.

   Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant whishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

   Within 20 month from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the IPEA/AT Austrian Patent Office Kohlmarkt 8-10 A-1014 Vienna Facsimile No. 1/53424/200	Authorized officer Koch Telephone No. +43 / 1 / 53424 - 450

Form PCT/ISA/220 (July 1998)

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article," "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended ?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When ? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments ?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How ? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments ?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

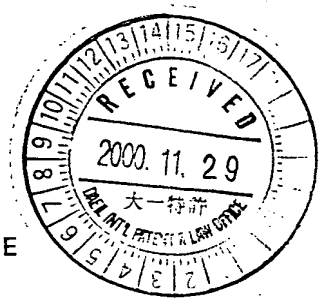
PCT

NOTIFICATION CONCERNING SUBMISSION OR TRANSMITTAL OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

LEE, Jong, Il
#904 BYC Building
648-1, Yeoksam-dong
Kangnam-ku
Seoul 135-080
RÉPUBLIQUE DE CORÉE



Date of mailing (day/month/year) 15 November 2000 (15.11.00)	
Applicant's or agent's file reference	**IMPORTANT NOTIFICATION**
International application No. PCT/KR00/00760	International filing date (day/month/year) 13 July 2000 (13.07.00)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 13 July 1999 (13.07.99)
Applicant KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY et al	

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).

2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.

3. An **asterisk(*)** appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

4. The **letters "NR"** appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

Priority date	Priority application No.	Country or regional Office or PCT receiving Office	Date of receipt of priority document
13 July 1999 (13.07.99)	1999/28253	KR	30 Augu 2000 (30.08.00)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

I. Britel

Telephone No. (41-22) 338.83.38

003657814

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

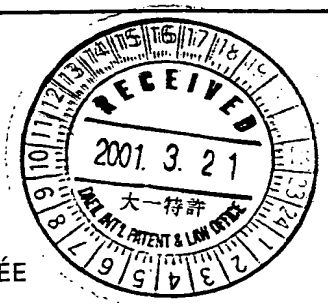
PCT

INFORMATION CONCERNING ELECTED OFFICES NOTIFIED OF THEIR ELECTION

(PCT Rule 61.3)

To:

LEE, Jong, Il
#904 BYC Building
648-1, Yeoksam-dong
Kangnam-gu
Seoul 135-080
RÉPUBLIQUE DE CORÉE



Date of mailing (day/month/year)	
15 March 2001 (15.03.01)	
Applicant's or agent's file reference	**IMPORTANT INFORMATION**

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/KR00/00760	13 July 2000 (13.07.00)	13 July 1999 (13.07.99)

Applicant
KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY et al

1. The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:

   EP :AT,BE,CH,CY,DE,DK,ES,FI,FR,GB,GR,IE,IT,LU,MC,NL,PT,SE
   National :JP,US

2. The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:

   None

3. The applicant is reminded that he must enter the "national phase" **before the expiration of 30 months from the priority date** before each of the Offices listed above. This must be done by paying the national fee(s) and furnishing , if prescribed, a translation of the international application (Article 39(1)(a)), as well as, where applicable, by furnishing a translation of any annexes of the international preliminary examination report (Article 36(3)(b) and Rule 74.1).

   Some offices have fixed time limits expiring later than the above-mentioned time limit. For detailed information about the applicable time limits and the acts to be performed upon entry into the national phase before a particular Office, see Volume II of the PCT Applicant's Guide.

   The entry into the European regional phase is postponed **until 31 months from the priority date** for all States designated for the purposes of obtaining a European patent.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer:

Juan Cruz

Telephone No. (41-22) 338.83.38

WO 01/04665
PCT/KR00/00760

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:
LEE, Jong, Il
#904 BYC Building
648-1, Yeoksam-dong
Kangnam-gu
Seoul 135-080
RÉPUBLIQUE DE CORÉE

Date of mailing (day/month/year) 18 January 2001 (18.01.01)	
Applicant's or agent's file reference	**IMPORTANT NOTICE**
International application No. PCT/KR00/00760	**International filing date** (day/month/year) 13 July 2000 (13.07.00)
Priority date (day/month/year) 13 July 1999 (13.07.99)	
Applicant KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY et al	

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
   US

   In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
   EP,JP

   The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on
   18 January 2001 (18.01.01) under No. WO 01/04665

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, **a demand for international preliminary examination** must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the **national phase**, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer
J. Zahra

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

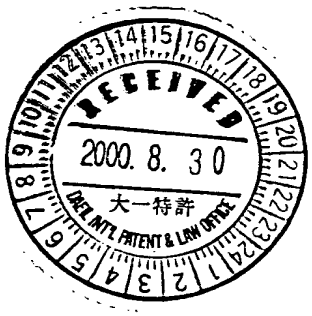
PCT

NOTIFICATION OF RECEIPT OF RECORD COPY

(PCT Rule 24.2(a))

To:

LEE, Jong, Il
#904 BYC Building
648-1, Yeoksam-dong
Kangnam-ku
Seoul 135-080
RÉPUBLIQUE DE CORÉE



Date of mailing (day/month/year)	IMPORTANT NOTIFICATION
22 August 2000 (22.08.00)	
Applicant's or agent's file reference	**International application No.**
	PCT/KR00/00760

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below.

Name(s) of the applicant(s) and State(s) for which they are applicants:

KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY (for all designated States except US)
SON, Jung, Young et al (for US)

International filing date	:	13 July 2000 (13.07.00)
Priority date(s) claimed	:	13 July 1999 (13.07.99)
Date of receipt of the record copy by the International Bureau	:	04 August 2000 (04.08.00)
List of designated Offices	:	

EP :AT,BE,CH,CY,DE,DK,ES,FI,FR,GB,GR,IE,IT,LU,MC,NL,PT,SE
National :JP,US

ATTENTION

The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the international application, the applicant should immediately inform the International Bureau.

In addition, the applicant's attention is drawn to the information contained in the Annex, relating to:

- [X] time limits for entry into the national phase
- [X] confirmation of precautionary designations
- [X] requirements regarding priority documents

A copy of this Notification is being sent to the receiving Office and to the International Searching Authority.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer:

Anman QIU

Telephone No. (41-22) 338.83.38

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
18 January 2001 (18.01.2001)

PCT

(10) International Publication Number
WO 01/04665 A3

(51) International Patent Classification[7]: G02B 27/22, 27/24, G03B 21/56

(21) International Application Number: PCT/KR00/00760

(22) International Filing Date: 13 July 2000 (13.07.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1999/28253 13 July 1999 (13.07.1999) KR

(71) Applicant *(for all designated States except US)*: **KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY** [KR/KR]; #39-1 Hawolgok-dong, Sunbuk-gu, Seoul 136-791 (KR).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **SON, Jung, Young** [KR/KR]; #301-201, Hayanmaeul Grand Villd, 111, Gumi-dong, Bundang-gu, Sungnam-City, Kyeongki-do 463-500 (KR). **SMIRNOV, Vadim V.** [RU/RU]; Tusukrovsi Avenue. 1/13-321, Saimt-Fetervruge (RU). **LEE, Hyuk, Soo** [KR/KR]; #102-502. Hytsu Apt, Sagen-dong, Sungdong-gu, Seoul 133-060 (KR).

(74) Agent: **LEE, Jong, Il**; #904 BYC Building. 648-1, Yeoksam-dong, Kangnam-gu, Seoul 135-080 (KR).

(81) Designated States *(national)*: JP, US.

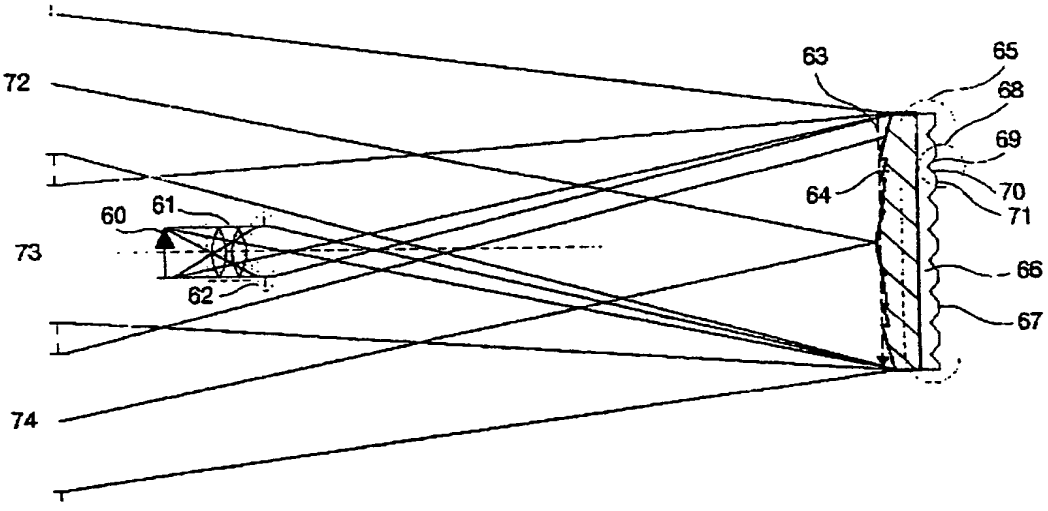
(84) Designated States *(regional)*: European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published:
— *with international search report*

(88) Date of publication of the international search report:
9 August 2001

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: 3-DIMENSIONAL IMAGING SCREEN FOR MULTI-VIEWER



(57) Abstract: The present invention employs a beam dividing prism corresponding to a size of a single pixel on a screen in order to create a plurality of viewing zones for multi-viewer, in which a prism panel (66) having a 1-dimensional or 2-dimensional arrangement of a prism cell (68) for dispersing beam in various directions is coupled to the 3-dimensional image projection screen (64) in order to increase the number of the viewing zones, and in which the number and position of the available viewing zones (72, 73, 74) are determined by the number and a relative position of disperse surfaces (69, 70, 71) in the prism cell (68). By using the present invention, the desired number of the viewing zones (72, 73, 74) can be created by selectively adopting the prism cells (68), so realizing the 3-dimensional image display system for multi-viewer.

WO 01/04665 A3

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
18 January 2001 (18.01.2001)

PCT

(10) International Publication Number
WO 01/04665 A2

(51) International Patent Classification[7]: G02B

(21) International Application Number: PCT/KR00/00760

(22) International Filing Date: 13 July 2000 (13.07.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1999/28253 13 July 1999 (13.07.1999) KR

(71) Applicant *(for all designated States except US)*: **KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY** [KR/KR]; #39-1 Hawolgok-dong, Sunbuk-gu, Seoul 136-791 (KR).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **SON, Jung, Young** [KR/KR]; #301-201, Hayanmaeul Grand Villd. 111, Gumi-dong, Bundang-gu, Sungnam-City, Kyeongki-do 463-500 (KR). **SMIRNOV, Vadim V.** [RU/RU]; Tusukrovsi Avenue, 1/13-321, Saimt-Fetervruge (RU). **LEE, Hyun, Soo** [KR/KR]; #102-502, Hytsu Apt, Sagen-dong, Sungdong-gu, Seoul 133-060 (KR).

(74) Agent: **LEE, Jong, Il**: #904 BYC Building, 648-1, Yeoksam-dong, Kangnam-gu, Seoul 135-080 (KR).

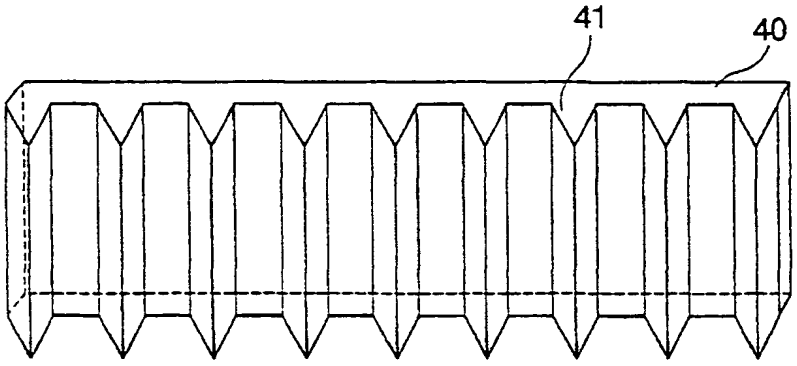
(81) Designated States *(national)*: JP, US.

(84) Designated States *(regional)*: European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published:
— *Without international search report and to be republished upon receipt of that report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: 3-DIMENSIONAL IMAGING SCREEN FOR MULTI-VIEWER



(57) Abstract: The present invention employs a beam dividing prism corresponding to a size of a single pixel on a screen in order to create a plurality of viewing zones for multi-viewer, in which a prism panel having a 1-dimensional or 2-dimensional arrangement of a prism cell for dispersing beam in various directions is coupled to the 3-dimensional image projection screen in order to increase the number of the viewing zones, and in which the number and position of the available viewing zones are determined by the number and a relative position of disperse surfaces in the prism cell. By using the present invention, the desired number of the viewing zones can be created by selectively adopting the prism cells, so realizing the 3-dimensional image display system for multi-viewer.

WO 01/04665 A2

COPY FOR IB

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Artcle 36 and Rule 70)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. **PCT/KR00/00760**	International filing date *(day/month/year)* 13 JULY 2000 (13.07.2000)	Priority date *(day/month/year)* 13 JULY 1999 (13.07.1999)

International Patent Classification (IPC) or national classification and IPC

IPC7 G02B 27/22, G02B 27/24, G03B 21/56

Applicant

Korea Institute of Science and Technology et al

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demamd	Date of completion of this report
31 JANUARY 2001 (31.01.2001)	22 OCTOBER 2001 (22.10.2001)
Name and mailing address of the IPEA/KR Korean Intellectual Property Office Government Complex-Daejeon, Dunsan-dong, Seo-gu, Daejeon Metropolitan City 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer KIM, Hyong Chol Telephone No. 82-42-481-5653

Form PCT/IPEA/409 (cover sheet) (July 1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International aplication No.
PCT/KR00/00760

I. Basis of the report

1. With regard to the elements of the international application:*

☒ the international application as originally filed

☐ the description:
pages _____ , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☐ the claims:
pages _____ , as originally filed
pages _____ , as amended (together with any statment) under Article 19
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☐ the drawings:
pages _____ , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☐ the sequence listing part of the description:
pages _____ , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application(under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination(under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide** and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained inthe international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disc losure in the international applicationas as filed has been furinshed.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheet _____

5. ☐ This opinion has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box(Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed." and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION

International aplication No.
PCT/KR00/00760

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-15	YES
	Claims	None	NO
Inventive step (IS)	Claims	3, 6, and 9-14	YES
	Claims	1, 2, 4, 5, 7, 8, and 15	NO
Industrial applicability (IA)	Claims	1-15	YES
	Claims	None	NO

2. Citations and explanations (Rule 70.7)

1. The documents D1=US-A-5064273 and D2=JP-A-0918896 are referred to in this report.

2. D1(figures 1 and 2A) discloses a projector with a screen (1) and a prism panel (5), where the prism panel is a lenticular lens of various shapes of prism cells and directs image beam into a desired angle of the field of view. D1 does not disclose 3-dimensional features. D2(figures 9 and 10) discloses a prism barrier (2) which directs stereo display image into relevant viewing zones. However, D2 does not discloses projectional features. The screen defined in claim 1 is thus considered new relative to the prior arts of D1 and D2. Since claims 2-15 are dependent claims referring back to claim 1, the screen defined in these claims are also new (Article 33(1) and (2) PCT).

3. The present invention defined by claims 1-15 does not describe any detailed means to achieve 3-dimensional effects other than showing Fresnel lens screen in figures 7 and 8. Therefore, the present invention is credited only for the feature of the prism panel with prism cells having a plurality of disperse surfaces. It is known in D1(figures 1 and 2A) that a projector screen (1) of Fresnel lens can be integrated on the back side by a panel of prism cells that have a plurality of disperse surfaces which direct image beam into field-of-views at the desired angles. It is also known in D2(figure 10) that 3-dimensional display can be directed at several different angles by prism panel (2). Therefore, it is obvious that the prism panel formed with prism cells having a plurality of disperse surfaces is adaptable for 3-dimensional projection screen. For the above reasons, claim 1 does not appear to be inventive.

Claims 2 and 4 delimit the thickness of the screen in a negative and indefinite way so that the delimited thickness is considered to fall within the usual range. It is usually known that each lenti is comparable in size to pixel as shown, for example, in D2. Therefore, claims 5 and 7 do not appear to be inventive. Claim 8 defines cross-sectional shapes of prism cells that are disclosed in or easily modified from D1 and D2. It is known from D2 the angle between disperse surfaces is near to 180 degrees. Therefore, claim 15 does not appear to be inventive.

In consequence, claims 1, 2, 4, 5, 7, 8 and 15 appear to lack an inventive step (Article 33(1) and (3) PCT).

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Reference signs in parentheses should have been inserted in the claims to increase their intelligibility (Rule 6.2(b) PCT).

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

"3-dimentional" appeared in the title, the description, and the claims must be corrected as "3-dimensional" (Rule 91.1(d) PCT).

The description does not disclose the invention per claims 5-7, 10, 11, and 13 in such terms that the technical problem and its solution can be understood and does not clearly state the possibly advantageous effects of the invention (Rule 5.1 (a) (iii) PCT).

Claims 8 and 12 are not clear and concise due to unnecessary " etc." (Article 6 PCT).

The description does not describe any detailed means to render the screen, as claimed, 3-dimensional other than showing Fresnel lens screen in figures 7 and 8. Therefore, the 3-dimensional imaging screen in the claims are not fully supported by the description (Article 6 PCT).

Claim 1 is vague, since the claim is illogical in stating that a screen projects an object on the same screen and a screen comprises the same screen (Article 6 PCT).

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
18 January 2001 (18.01.2001)

PCT

(10) International Publication Number
WO 01/04665 A3

(51) International Patent Classification[7]: G02B 27/22, 27/24, G03B 21/56

(21) International Application Number: PCT/KR00/00760

(22) International Filing Date: 13 July 2000 (13.07.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1999/28253 13 July 1999 (13.07.1999) KR

(71) Applicant *(for all designated States except US)*: **KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY** [KR/KR]; #39-1 Hawolgok-dong, Sunbuk-gu, Seoul 136-791 (KR).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **SON, Jung, Young** [KR/KR]; #301-201, Hayanmaeul Grand Villd, 111, Gumi-dong, Bundang-gu, Sungnam-City, Kyeongki-do 463-500 (KR). **SMIRNOV, Vadim V.** [RU/RU]; Tusukrovsi Avenue, 1/13-321, Saimt-Fetervruge (RU). **LEE, Hyuk, Soo** [KR/KR]; #102-502, Hytsu Apt, Sagen-dong, Sungdong-gu, Seoul 133-060 (KR).

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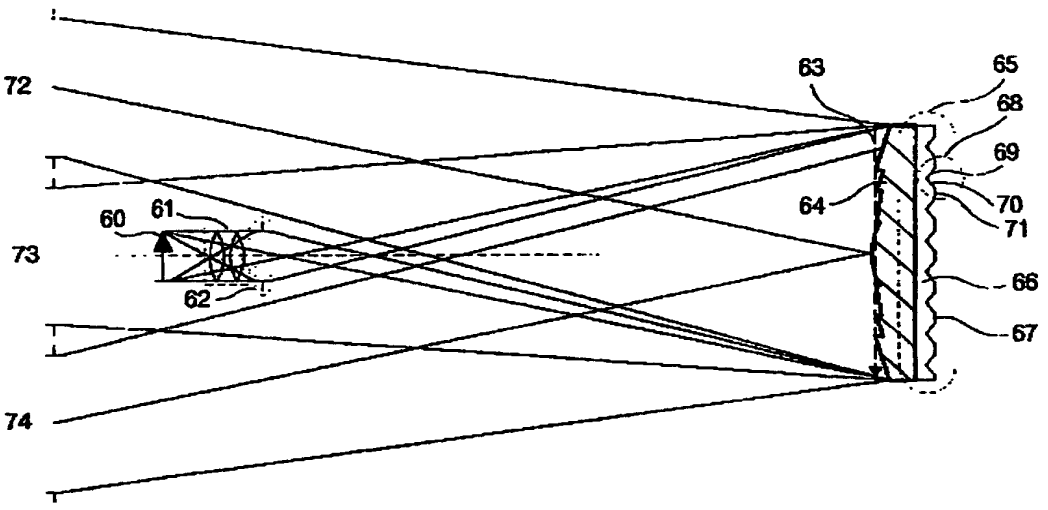
(54) Title: 3-DIMENSIONAL IMAGING SCREEN FOR MULTI-VIEWER



(57) Abstract: The present invention employs a beam dividing prism corresponding to a size of a single pixel on a screen in order to create a plurality of viewing zones for multi-viewer, in which a prism panel (66) having a 1-dimensional or 2-dimensional arrangement of a prism cell (68) for dispersing beam in various directions is coupled to the 3-dimensional image projection screen (64) in order to increase the number of the viewing zones, and in which the number and position of the available viewing zones (72, 73, 74) are determined by the number and a relative position of disperse surfaces (69, 70, 71) in the prism cell (68). By using the present invention, the desired number of the viewing zones (72, 73, 74) can be created by selectively adopting the prism cells (68), so realizing the 3-dimensional image display system for multi-viewer.

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPOQUE (WPI, EPODOC)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 09 274159 A (TOPPAN PRINTING CO.) 21 October 1997 (21.10.97) figs. 1-4.	1,2,13
A	US 5064273 A (LEE) 12 November 1991 (12.11.91) column 3, line 19 - column 5, line 9.	1-3,13
A	DE 2248873 A (CANON) 12 April 1973 (12.04.73) figs. 2-5, page 4, line 10 - page 5, line 6.	1,2
A	US 4390239 A (HUBER) 28 June 1983 (28.06.83) abstract, column 3, line 11 - column 4, line 68.	1,2,8,12,13

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
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Patent document cited in search report			Publication date	Patent family member(s)			Publication date
DE	A1	2248873	12-04-1973	GB	A	1403783	20-08-1975
DE	B2	2248873	11-01-1979	JP	A2	48043629	23-06-1973
DE	C3	2248873	30-08-1979	US	A	4078854	14-03-1978
JP	A	09274159 A2				none	
US	A	4390239	28-06-1983	AT	E	5921	15-02-1984
				DE	A1	3018449	19-11-1981
				DE	C2	3018449	05-01-1983
				EP	A2	39768	18-11-1981
				EP	A3	39768	25-11-1981
				EP	B1	39768	18-01-1984
				JP	A2	57006833	13-01-1982
US	A	5064273	12-11-1991	KR	Y1	9201308	22-02-1992

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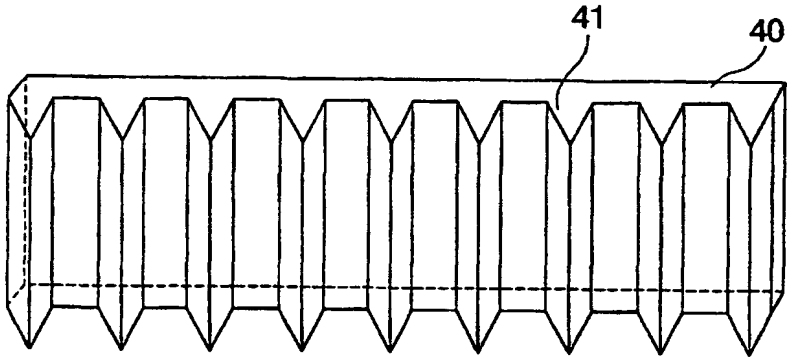

(57) Abstract: The present invention employs a beam dividing prism corresponding to a size of a single pixel on a screen in order to create a plurality of viewing zones for multi-viewer, in which a prism panel having a 1-dimensional or 2-dimensional arrangement of a prism cell for dispersing beam in various directions is coupled to the 3-dimensional image projection screen in order to increase the number of the viewing zones, and in which the number and position of the available viewing zones are determined by the number and a relative position of disperse surfaces in the prism cell. By using the present invention, the desired number of the viewing zones can be created by selectively adopting the prism cells, so realizing the 3-dimensional image display system for multi-viewer.

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3-DIMENTIONAL IMAGING SCREEN FOR MULTI-VIEWER

TECHNICAL FIELD

The present invention relates to a 3-dimentional imaging screen for multi-viewer, and in particular to a 3-dimentional imaging screen for simultaneously watching a 3-dimentional image by multi-viewer without wearing glasses, in which the screen comprises a beam dividing prism corresponding to a pixel on screen, the beam dividing prism dividing an incident beam on the screen into a vertical and/or horizontal direction according to the shape thereof.

BACKGROLUND ART

It has been studied about a display device with which viewers may watch a conventional 2-dimentional image, such as television image, like a 3-dimentional image. In order to watch the conventional 3-dimentional image, the viewers generally wear a pair of polarized glasses which make the 3-dimentional image, by using a visual timing difference, from the 2-dimentional images which were made by using a plurality of cameras when taking images for a television program or movie.

For an example, the US 4,559,556 discloses a system for viewing three dimentional images. The viewing system comprises a filter mat having two juxtaposed polarizing filters for placement over a television viewing screen or other rear surface projection device in substantial registry with two similarly juxtaposed and slightly different images of a common scene or subject. The polarizing filters are oriented on different axes to polarize the light from the two images on different axes. The viewer observes these polarized images through eyeglasses.

However, it has caused expenses and inconvenience according to the manufacturing the conventional 3-dimentional image and using glasses. In order to overcome the problems, there is developed a 3-dimentional image screen by a viewing zone recently, in which the 3-diemtional image screen by the viewing zone embodies the 3-dimentional image on the image incident screen itself, which enables a lot of viewer to watch the image without wearing the polarized glasses.

Preferably the viewing zone for displaying the 3-dimentional image should be generated as many as possible. For that reason, there is a method that a plurality of image incident devices are used as many as the viewing zones with use of such as a lenticular, a spherical reflective panel or a Fresnel lens for projecting the image. In addition, there is another method which uses a holographic screen for generating a plurality of viewing zones on a single screen.

The holographic screen uses a hologram serving as a kind of optical elements. When writing the hologram, the holographic screen writes several phases of an oriented object having diffrent direction on one hologram by multi-exposing with moving position of a photosensitive panel or the object, or with moving the position of the photosensitive panel and with changing the object itself.

The method for generating a plurality of viewing zones with use of a lenticular, a spherical reflective panel or a Fresnel lens can be easily embodied for providing the 3-dimensional image but not good in efficiency. Particularly, though it can enlarge size of screen for expanding the size of the viewing zone, the lenticular screen is still inefficient in fact that only a few viewers can watch the screen in comparison with the size of the screen.

In detail, the method for expanding size of the viewing zone with use of the

lenticular screen may be achieved by enlarging the size of the lenticular lens and increasing the number of the images in different viewing directions. For example, assuming that a shoulder of a viewer has a width of about 40cm, the viewing zone requires at least 80cm width for two viewers to watch the 3-dimentional image at the same time. Assuming that a distance between eyes is 6.5cm, at least 13 images having different viewing directions are required in order to form the 80cm width viewing zones. Therefore, there is a technical limitation in that the number of the images having different viewing directions as well as the size of the projection lens should be continuously increased because the viewing zone size should be steadily increased by over 40cm in order to increase the number of viewers at the same time.

Accordingly, the method to expand the size of the viewing zone among various methods for multi-viewer is not efficient comparing with the method increasing the number of the viewing zones.

In addition, multi-exposure hologram using the holographic screen also has some problems in a screen brightness because the diffraction efficiency decreases in an inverse proportion to a root value of the number of the multi-exposure.

DISCLOSURE OF THE INVENTION

The present invention is designed to solve the above problems. Therefore, an object of the present invention is to provide a 3-dimentional imaging screen for multi-viewer which maintains a proper screen brightness on the single screen such that a plurality of viewers can watch the screen at the same time, and which configures the number of the viewing zones according to the number of the viewers.

The object of the present invention is accomplished by providing a

configuration of a screen, which can make the number of the viewing zone increased, resulting that the multi-viewer may watch the 3-dimentional image simultaneously.

The technical spirit of the present invention is achieved by using a prism panel together with a 3-dimentional image projection screen, in which the prism panel consists of an 1-dimentional or 2-dimentional array of prism cells which can disperse a projected image to each direction determined by each pixel.

In other words, the 3-dimentional imaging screen for multi-viewer which projects an object on the screen such that viewers watch a 3-dimentional image, wherein the screen comprises a 3-dimentional image projection screen positioned to a direction of an incident beam of the image, and a prism panel is formed with prism cell having a plurality of disperse surfaces of the incident beam on a rear surface of the 3-dimentional image projection screen, whereby the number of viewing zones is corresponding to the number of the disperse surfaces of the prism cell.

The prism panel is coupled to the rear surface of the 3-dimentional image projection screen, and the 3-dimentional image projection screen has enough thickness not to generate an interference effect such as a moir_ interference pattern.

The prism panel is installed to the rear surface of the 3-dimentional image projection screen having a predetermined distance therebetween, and the distance between the 3-dimentional image projection screen and the prism panel is properly spaced apart not to generate the interference effect such as a moir_ interference pattern.

The prism panel is formed and integrated to the rear surface of the 3-dimentional image projection screen in a emboss or engrave manner, and the 3-dimentional image projection screen has enough thickness not to generate the interference effect such as moir_ interference pattern.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages of the present invention will become more apparent from the description of a preferable embodiment with reference to the drawings, in which;

FIG. 1 is for showing a principle of forming a viewing zone of an image projection screen having characteristics of a spherical reflective panel,

FIG. 2 is for showing a principle of forming a viewing zone of an image projection screen having characteristics of a lens,

FIGs. 3A, 3B and 3C show configurations of prism panels in accordance with one embodiment of the present invention,

FIG. 4 shows configurations of various types of prisms forming a prism panel of the present invention,

FIG. 5 shows a configuration of a 3-viewing zone prism panel according to another embodiment of the present invention,

FIG. 6 shows a configuration of a 7-viewing zone prism panel according to still another embodiment of the present invention,

FIGs. 7A and 7B are for illustrating an embodiment of 3-dimentional image screen for multi-viewer of the present invention, and

FIG. 8 is for showing still another embodiment of 3-dimentional image screen for multi-viewer of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Hereinafter, configurations and operations of embodiments of the invention

will be described with the reference to the accompanying drawings in detail. First of all, for the best understanding of the present invention, there will be explained a principle for forming a viewing zone in the image projection system.

FIG. 1 is for showing how the viewing zone is formed in case of projecting an image on an image projection screen having characteristics of a spherical reflective mirror.

As shown in FIG. 1, the image displayed on an image display screen 2 of an image generating unit 1 is projected on the image projection screen 6 through a projection lens 3. The image 5 projected on the image projection screen 6 can be watched by viewers in an area, where an image of an egress opening unit 4 of the projection lens 3 is shown up by way of the image projection screen 6. The area where the image of the egress opening unit 4 of the projection lens 3 is shown is called a viewing zone.

FIG. 2 is for showing a principle how the viewing zone is formed in case of projecting image on an image projection screen having lens characteristics.

As shown in FIG. 2, a first object 10 and a second object 11 are shown as images 16, 17 of projection lens 12, 13 and egress opening units 14, 15 respectively onto an image projection screen 18. The image projection screen 18 forms the images of the egress opening units 14, 15 of the projection lens 12, 13 on a first viewing zone 19 and a second viewing zone 20.

FIG. 3A is for illustrating a configuration of a prism panel applied to a 3-dimentional image projection screen of the present invention.

FIG. 3B is for illustrating a reflection effect of an incident beam according to a configuration of a prism cell, in case that the prism cell is a reflective type.

FIG. 3C shows a configuration of a prism cell having a disperse surface of an incident beam corresponding to the number of required viewing zones.

As shown in FIG. 3A, the prism panel 30 of the present invention has an 1-dimentional or 2-dimentional arrangement in which the prism cells 31 are in contact each other for dispersing the incident beam 32 to different directions.

As shown in FIG. 3B, when the prism cell 31 is in use of reflection, a surface 35 of the prism cell should be coated to reflect the incident beam completely. The number of the disperse surfaces in the prism cell 31 is corresponding to the number of the required viewing zones as shown in FIG. 3, and the surfaces are in contact each other at a constant angle.

Referring to FIG. 3B, reflection and transmission characteristics of the incident beam is explained now in either case that the prism cell is a reflective type and transmitting type.

When the prism cell is a spherical reflective type, a front surface 36 of the prism, or two disperse surfaces 38, 39 which are not parallel to the incident surface of the beam are symmetric to a normal direction of the prism panel 30 and when an angle therebetween is θ, the beam 34 on the paper plane incident at an angle α to the normal direction 33 is reflected at an angle of $[180°-\theta+\alpha]$ to the normal direction 33 on the disperse surface 38 and is reflected at the angle of $[180°-\theta-\alpha]$ on the disperse surface 39. And the beam 34 is reflected at an α angle on the disperse surface 37 parallel to the front surface 36 of the prism. Therefore, preferably, the angle θ should be as close as 180° in order to remove the reflection effect generating between the disperse surfaces.

In addition, in case that the prism cell is a transmitting type, the surface 35 of the prism cell 31 does not require the reflective coating. In that case, if the refractivity

of the prism cell is n, a transmitting angle of the incident beam to the disperse surface is $\sin^{-1}\{n \cos(\theta/2-\alpha)\}$ in case of the disperse surface 38 of the FIG. 3b, and $\sin^{-1}\{n \cos(\theta/2+\alpha)\}$ in case of the disperse surface 39 and $\sin^{-1}(n \sin \alpha)$ in case of the disperse surface 37. Accordingly, the position of each viewing zone can become closer or farther in accordance with the angle θ.

In accordance with the reflecting or transmitting characteristics of the prism cell, positions of various directions and the number of the viewing zones which are required for forming the viewing zone of the 3-dimentional imaging screen for multi-viewer, may be determined.

FIG. 4 is for illustrating various types of prism cells applied to the 3-dimensional image screen for multi-viewer of the present invention.

When requiring the viewing zone to be positioned in a vertical or horizontal direction, the prism cells can be applied to have various embossing or engraving shapes according to the number of the viewing zones. In other words, when the number of the viewing zones is 2, the prism cell has a triangle shape (a), when the number of the viewing zones is 3, the prism cell has a dove shape (b), when the number of the viewing zones is 4, the prism cell has a tetragonal type (d), when the number of the viewing zones is 5, the prism cell has a pentagonal type (d), _ and etc. The length of the prisms is at least the same as or longer than the height of the image projection screen. In addition, it is preferred that the width of the prism cells is narrower than a width of one pixel which is projected on the image projection screen in case that the prism cell has 2-dimentional arrangement. It is the reason that the resolution thereof would be degraded when the width is larger than a single pixel size. However, the width and the number of the disperse surfaces should be selected to minimize the diffraction

phenomena because the viewing zone of each viewing point can be overlapped by the diffraction according to each disperse surface in case of multi-viewing zone image when a pitch or width of the disperse surface is too small.

Additionally, in case of requiring that the position of the viewing zone is to be formed to vertical, horizontal and middle directions at the same time, the prism cell has types of a truncated triangular pyramid (e), a truncated tetragonal pyramid (f), a truncated pentagonal pyramid (g), a truncated hexagonal pyramid (h),_, and etc. having various embossing and engraving shapes according to the required number of viewing zones. In this case, the projection on the respective disperse surface should be applied to have same area in order to maintain the same brightness of each viewing zone. And it is preferred that the width of the prism cell is smaller than a width of a single pixel of an image projected on the image projection screen in case that the prism cell has 2-dimentional arrangement. When the width is larger than a single pixel, the resolution is degraded. However, because, when a pitch or the width of the disperse surface is too small, the viewing zones can be overlapped owing to a diffraction of each disperse surface in a multi-viewing case, the width and the number of the disperse surface should be selected to minimize the diffracting phenomena.

FIG. 5 shows an example in which the prism cell in an 1-dimensional arrangement has a 3-viewing zone prism panel according to another embodiment of the present invention. By way of the prism panel 40 of FIG. 5, the prism cell 41 of a truncated triangular pyramid type having various embossing and engraving shapes has an 1-dimentional arrangement such that it is capable of generating the 3 viewing zone to a desired vertical or horizontal direction.

FIG. 6 shows an example in which the prism cell in a 2-dimentional

arrangement has a 7-viewing zone panel according to still another embodiment of the present invention. According to a prism panel 50 of FIG. 6, the prism cell 51 of a truncated hexagonal pyramid (h) type having various embossing and engraving shapes has a 2-dimentional arrangement in order to form 7-viewing zones in upper, lower, left, right and center directions which are determined by a relative positions of the disperse surfaces in the prism cell 51. In this case, the prism panel can be rotated to form the viewing zone to a desired direction. And an angle between the prism cells should be near to 180° in order not to cause the reflection effect therebetween.

Now, it will be explained about configurations and operations of embodiments of the 3-dimentional image screen for multi-viewer which employs a prism panel having prism cells applied to the 3-dimentional image screen for multi-viewer of the present invention, in detail.

FIGs. 7A and 7B show embodiments that the viewing zone is formed by a prism panel having a reflective coating and a 3-dimentional image screen for multi-viewer of the present invention.

The screen of the present invention shown in FIG. 7 comprises an object 60 to be projected, a projection lens 61 installed apart from the object 60 at a constant distance, an egress opening unit 62 installed adjacent to a projecting direction of the projection lens 61, a 3-dimentional image projection screen 64 for transmission installed opposite to and apart from the object 60 at a constant distance, and a prism panel 66 formed by prism cells 68 coupled to an even surface which is a rear surface of the 3-dimentional image projection screen 64.

The 3-dimentional image projection screen is made by a transparent material such as a flannel lens or a projective holographic screen. In addition, the prism cell 68

of the prism panel 66 is configured by arranging the prism cell having the truncated triangular pyramid (e) type for generating a 3-viewing zone in an 1-dimentional arrangement.

To describe an operation of generating a viewing zone on the screen of the present invention having the above configuration, a beam for the object 60 projected by the light source (not shown in figure) is focused and diffused through the projection lens 61 and the egress opening unit 62 and then projected as an image on the 3-dimentional image projection screen 64. The beam providing the projected image 63 on the 3-dimentional image projection screen 64 is reflective by the disperse surfaces 69, 70, 71 of the respective prism cell 68 of the prism panel 66 coupled to the rear of the 3-dimentional image projection screen 64, then is dispersed to 3 other directions in order to form an image of the egress opening 62, or the viewing zone, in a position of the projection lens 61. In this case, the first viewing zone 72 is form by the disperse surface 71 of the prism cell 68, the second viewing zone 73 is formed by the disperse surface 69, and the third viewing zone 74 is formed by the disperse surface 70.

In order to move a position of the viewing zone in this case, a thickness of the prism panel 66 is not constant, but can be decreased or increased to a width or height direction. In other words, the position of the viewing zone is moved proportional to a change of thickness of the prism panel.

In addition, the prism panel 66 is coupled to the even rear surface of the 3-dimentional image projection screen 64 of the 3-dimentional image screen for multi-viewer in order to form the above viewing zone, referring to FIG. 7a. It is not concerned that the screen 64 may be coupled to an even surface of the prism panel 66 or to a surface of the prism panel having the embossing and engraving shapes. It is the

reason that the surface having the embossing and engraving shapes of the prism cell has a reflective coating formed on a surface thereof, in case of reflective type.

Additionally, it is possible to form the prism cell on the even rear surface of the 3-dimentional image projection screen 64 by embossing or engraving the even rear surface. In this case, the thickness of the 3-dimentional image projection screen 64 should be enough not to have the moir_ interference pattern.

The 3-dimentional image projection screen 64 and the prism panel 66 may be contacted each other or be apart from each other having a constant distance. When requiring the constant distance between the 3-dimentional image projection screen 64 and the prism panel 66, the distance should be adjusted properly not to have an interference effect such as moir_ interference pattern which may be generated on the 3-dimentional image projection screen 64 by the reflective beam of the disperse surface of the prism cell according to the configuration of the 3-dimentional image projection screen 64.

FIG. 8 is for illustrating how the viewing zone is generated by the configuration of the 3-dimentional image screen for multi-viewer when the screen is a transmitting type.

Referring to FIG. 8, the screen comprises an object 80 to be projected, a projection lens 81 installed apart from the object 80 at a constant distance, an egress opening unit 82 installed adjacent to a projecting direction of the projection lens 81, a 3-dimentional image projection screen 84 installed apart from the object 80 at a constant distance, and a prism panel 85 formed by a transmitting prism cell coupled to a rear surface of the 3-dimentional image projection screen 84.

The type, configuration and coupling state of the 3-dimentional image

projection screen 84 and the prism panel 85 are identical to those in FIGs. 7A and 7B. However, it is different only in this point not to form a reflective coating on the surface of the prism cell such that the prism cell serves in a transmitting type.

Accordingly, the viewing zones are formed at an opposite position to the projection lens 81 by the projection screen of the present invention. That is, it can be seen that the first viewing zone 86, the second viewing zone 87, and the third viewing zone 88 are created at a position constant apart from the prism panel in a predetermined distance.

As described above, by coupling the 3-dimentional image screen, comprised by the flannel lens or the projective holographic screen and various types of the prism cells, on the prism panel having the 1-dimentional or 2-dimentional arrangement, the present invention provides an advantage that the number of viewing zones and the location can be formed according to the prism cell, as desired. And also, according to the screen of the present invention, it may be efficient that the multi-viewer may watch the image on the single screen without any damage of the resolution of the display by configuring the size of the disperse surface of the prism cell after determining and adjusting relationship with the size of the single pixel of the image.

The present invention is not limited to the specifically disclosed embodiments, and variations and modifications may be made without departing from the scope of the present invention.

What is claimed is:

1. A 3-dimentional imaging screen for multi-viewer which projects an object on the screen such that viewers watch a 3-dimentional image, the screen comprising:

a 3-dimentional image projection screen positioned to a direction of an incident beam of the image, and

a prism panel formed with prism cell having a plurality of disperse surfaces of the incident beam on a rear surface of the 3-dimentional image projection screen,

whereby the number of viewing zones is corresponding to the number of the disperse surfaces of the prism cell.

2. A 3-dimentional imaging screen for multi-viewer as claimed in claim 1, wherein the prism panel is coupled to the rear surface of the 3-dimentional image projection screen, and the 3-dimentional image projection screen has enough thickness not to generate an interference effect such as a moir_ interference pattern.

3. A 3-dimentional imaging screen for multi-viewer as claimed in claim 1, wherein the prism panel is installed to the rear surface of the 3-dimentional image projection screen having a predetermined distance therebetween, and the distance between the 3-dimentional image projection screen and the prism panel is properly spaced apart not to generate the interference effect such as a moir_ interference pattern.

4. A 3-dimentional imaging screen for multi-viewer as claimed in claim

1, wherein the prism panel is formed and integrated to the rear surface of the 3-dimentional image projection screen in a emboss or engrave manner, and the 3-dimentional image projection screen has enough thickness not to generate the interference effect such as moir_ interference pattern.

5. A 3-dimentional imaging screen for multi-viewer as claimed in claim 1, wherein the prism panel is configured by that the prism cell of which a size is corresponding to a size of one pixel of the projected image on the 3-dimentional image projection screen is formed in an emboss or engrave manner in an 1-dimentional arrangement.

6. A 3-dimentional imaging screen for multi-viewer as claimed in claim 5, wherein a height of the prism cell is equal to or higher than a height of the 3-dimentional image projection screen, and a width of the prism cell is equal to or narrower than a width of one pixel of the projected image on the 3-dimentional image projection screen.

7. A 3-dimentional imaging screen for multi-viewer as claimed in claim 5, wherein the width of the prism cell is wider than the width of the pixel of the projected image on the 3-dimentional image projection screen.

8. A 3-dimentional imaging screen for multi-viewer as claimed in claim 5, wherein the prism cell is configured into one of a triangular prism, a dove prism, a tetragonal prism, a pentagonal prism, a hexagonal prism, etc., according to the number

of required viewing zones.

9. A 3-dimentional imaging screen for multi-viewer as claimed in claim 1, wherein the prism panel is configured by that the prism cell of which a size is corresponding to a size of one pixel of the projected image on the 3-dimentional image projection screen is formed in an emboss or engrave manner in a 2-dimentional arrangement.

10. A 3-dimentional imaging screen for multi-viewer as claimed in claim 9, wherein a sectional area of the prism cell is equal to or smaller than area of the pixel of the projected image on the 3-dimentional image projection screen.

11. A 3-dimentional imaging screen for multi-viewer as claimed in claim 9, wherein a sectional area of the prism cell is greater than area of the pixel of the projected image on the 3-dimentional image projection screen.

12. A 3-dimentional imaging screen for multi-viewer as claimed in claim 9, wherein the prism cell is configured into one of a triangular prism, a tetragonal prism, a pentagonal prism, a hexagonal prism, etc., according to the number of required viewing zones.

13. A 3-dimentional imaging screen for multi-viewer as claimed in any one of claims 1 to 12, wherein a thickness of the prism panel is constant or the thickness of the prism panel is decreased or increased in a constant ratio to a width or height

direction.

14. A 3-dimentional imaging screen for multi-viewer as claimed in claim 13, wherein the prism cell has a reflective coating formed on a surface thereof.

15. A 3-dimentional imaging screen for multi-viewer as claimed in claim 14, wherein an angle between the disperse surfaces in prism cell is near to 180 degrees.

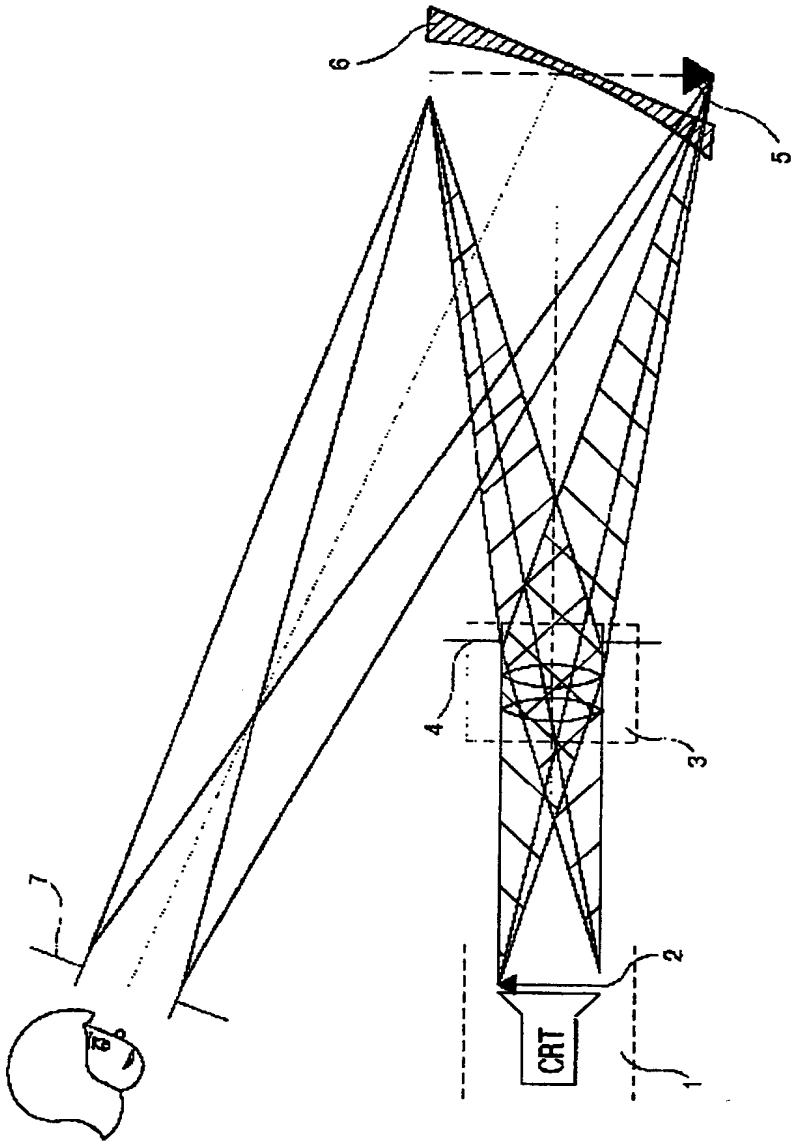

FIG. 1

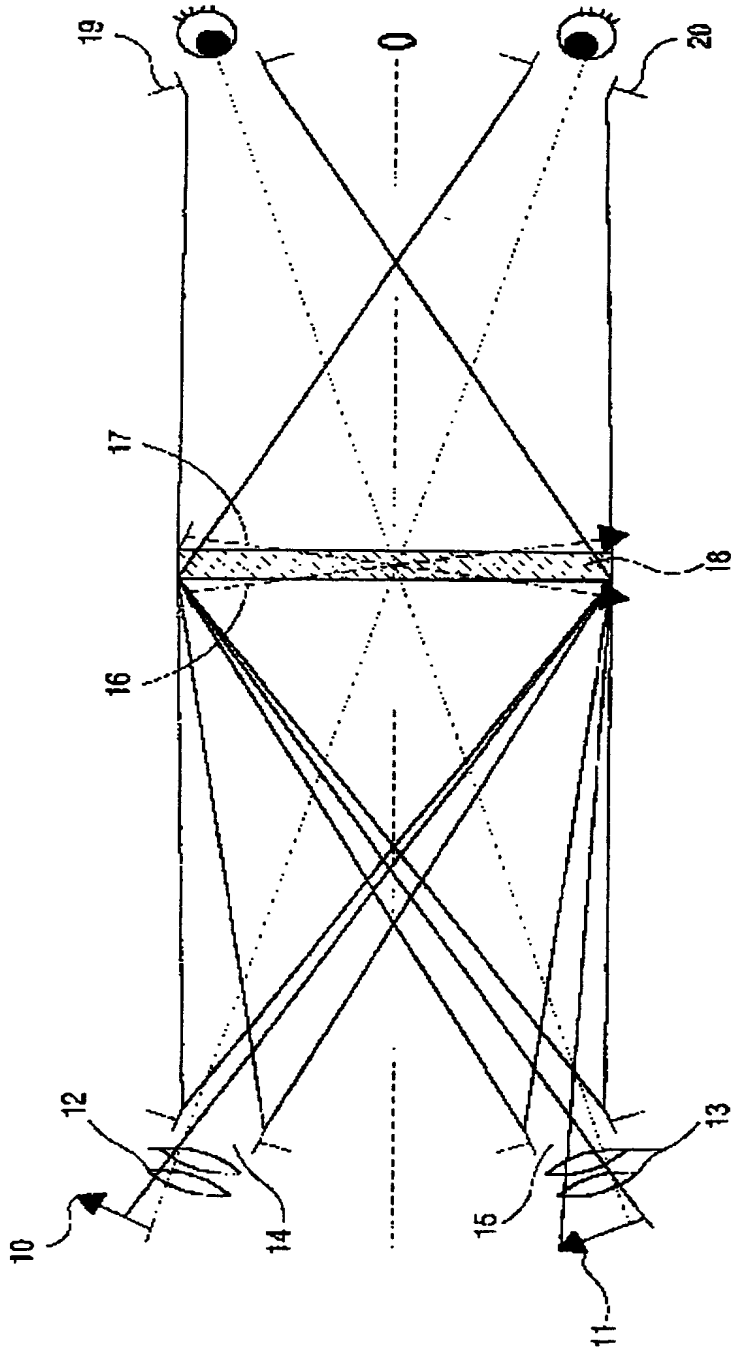

FIG. 2

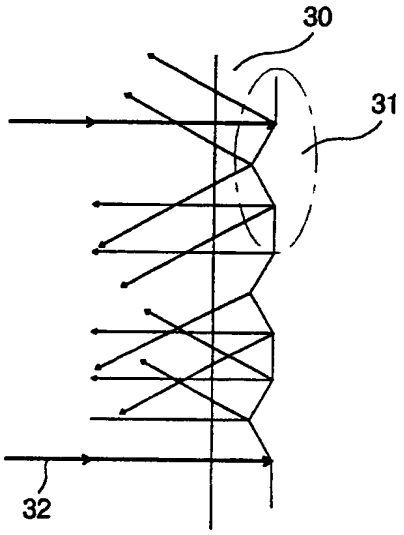

FIG. 3A

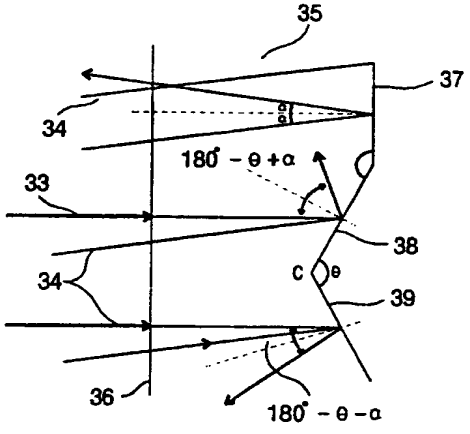

FIG. 3B

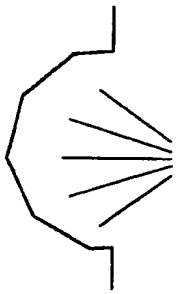

FIG. 3C

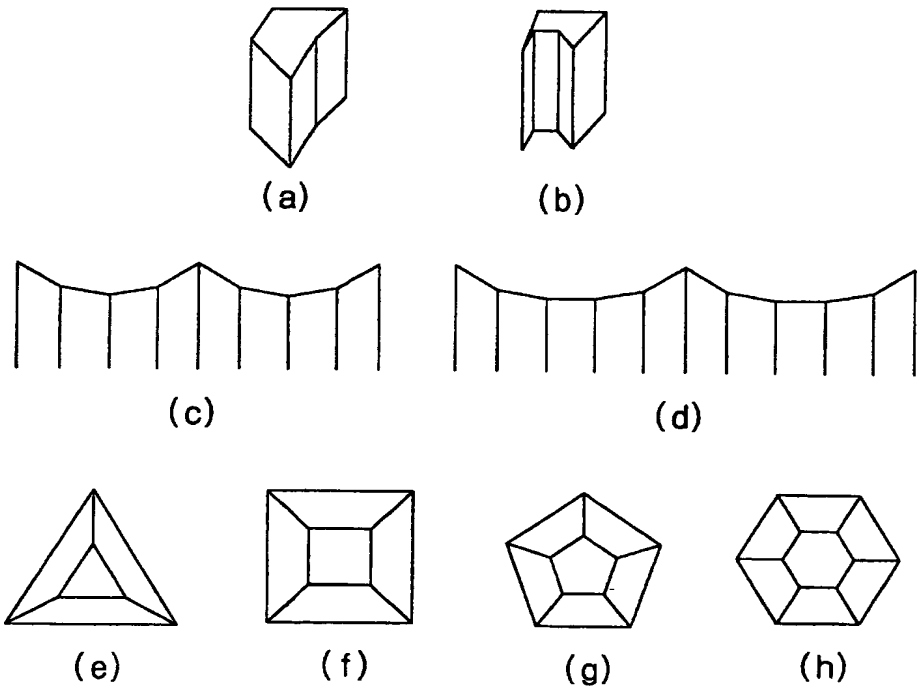

FIG. 4

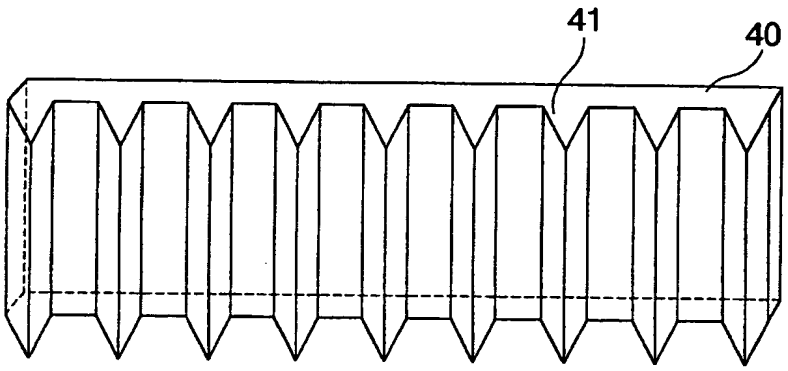

FIG. 5

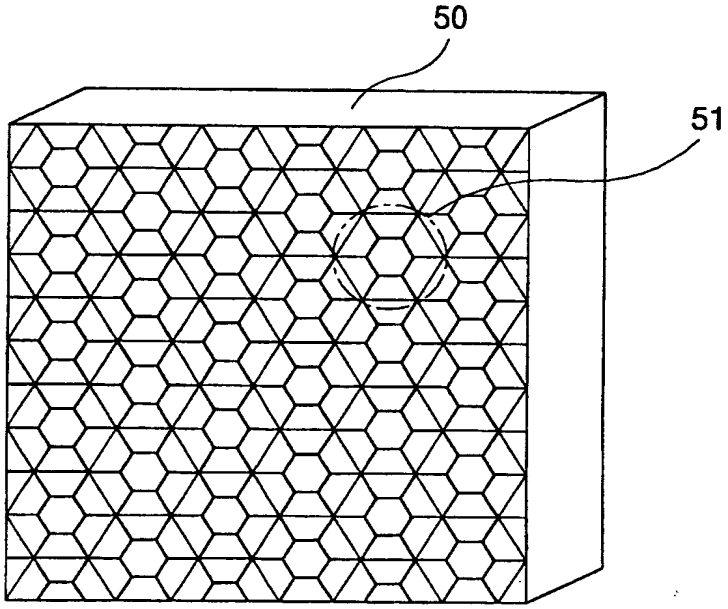

FIG. 6

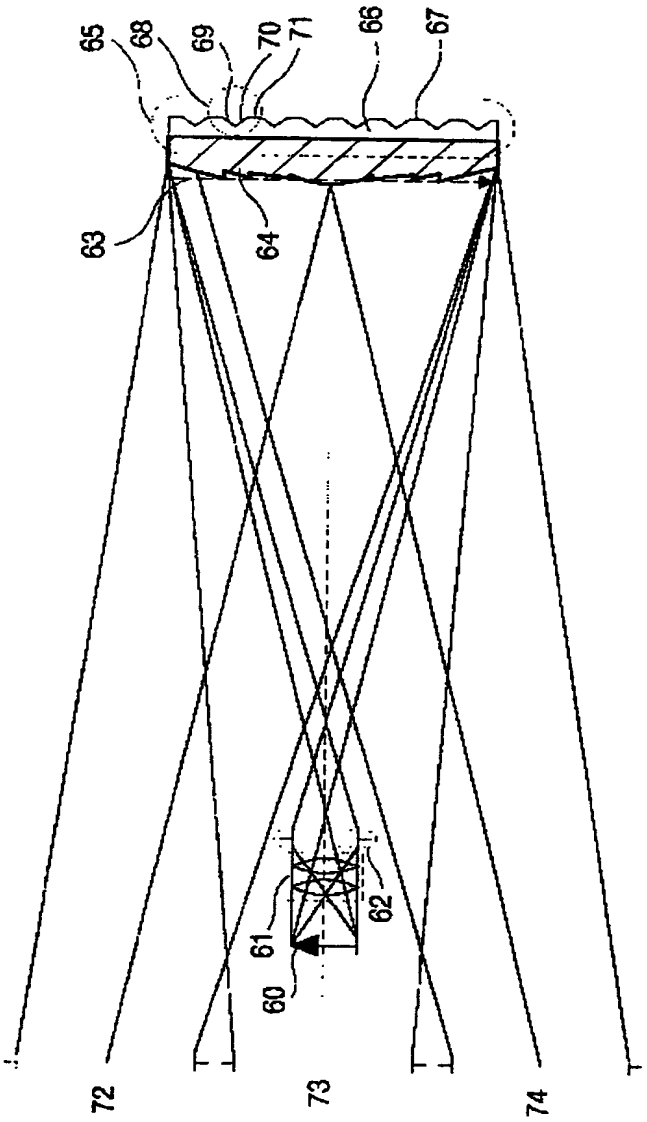

FIG. 7A

FIG. 7B

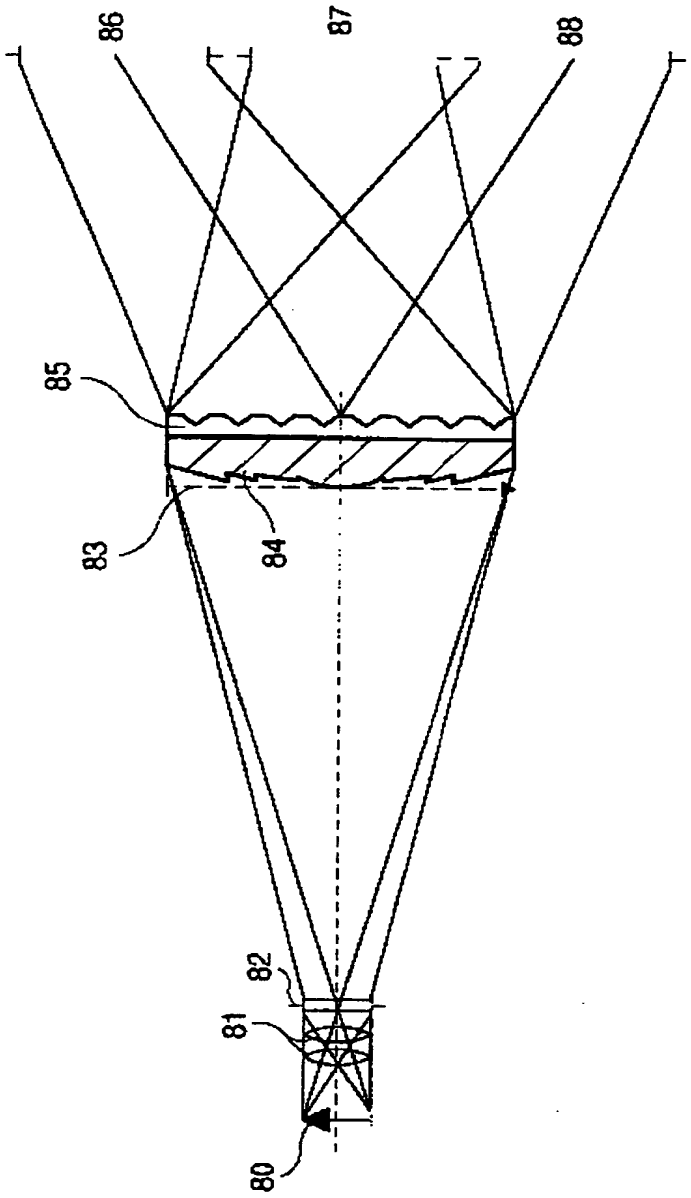

FIG. 8